

Serial Module Communication Protocol

CONTENTS

| | |
|---|----------|
| Command Format | 2 |
| I ² C Control Method | 2 |
| UART Control Method..... | 3 |
| Control Command | 4 |
| TX Control Command – only for the TX Module | 4 |
| RX Control Commands – only for RX Module..... | 6 |

This communication protocol is applied to both the Serial OOK Transmitter Module 433MHz (product ID: BCM-2102-X03) and the Serial OOK Receiver Module 433MHz (product ID: BCM-2401-C03).

Command Format

| Command (8 bits) | | | | | | | | Data (8 bits) | | | | | | | |
|------------------|----|----|----|----|----|----|----|---------------|----|----|----|----|----|----|----|
| C7 | C6 | C5 | C4 | C3 | C2 | C1 | C0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |

The Command format is classified into two types:

- CmdO: Only command, without data
- CmdD: Commands followed by data

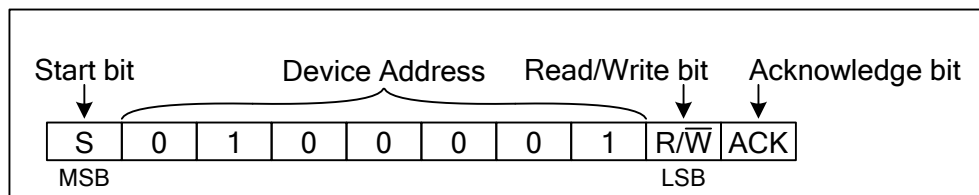
I²C Control Method

The I²C control method must distinguish between "Master" and "Slave". Slave refers to the module being controlled while Master refers to the MCU used for module control. Device address is essential for the I²C control method. The TX module device address is fixed as 0100001b and the RX module device address is fixed as 0100100b.

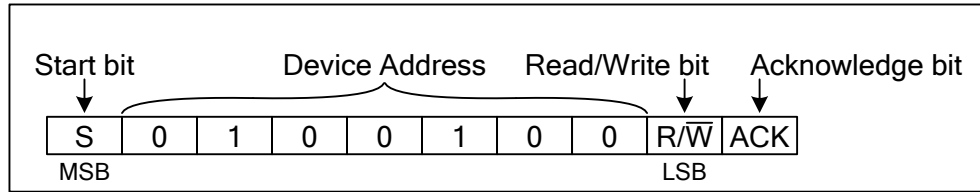
Note: The I²C clock speed must not exceed 100kHz.

I²C Timing

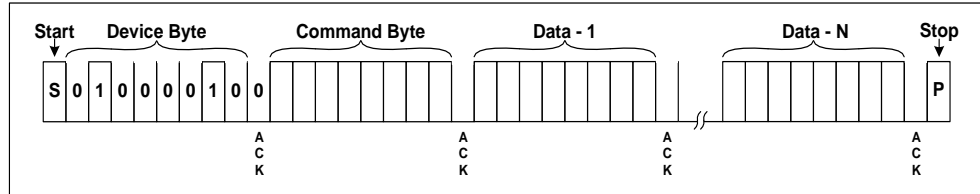
- TX Device Byte



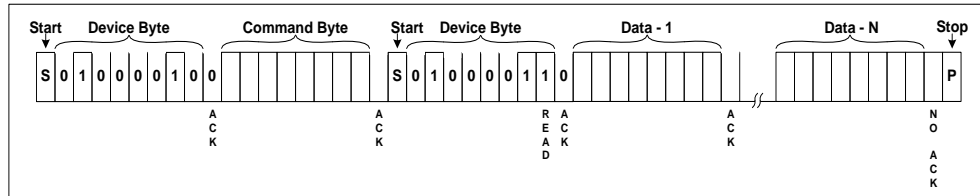
- RX Device Byte



- Write Sequential – Taking the TX module as an example



- Read Sequential – Taking the TX module as an example



UART Control Method

The UART control method requires neither the device byte nor Master/Slave distinction. However module control is also implemented by commands sent from the Master MCU.

Write Command

The master MCU sends commands and parameters through the UART TX pin to the RX/SCL pin in the module. The module will function according to the received commands. Commands should be written sequentially if more than one command is required.

Read Command

Data reading is implemented by commands. Therefore, the master MCU must send one READ command byte through the UART TX pin to the module. The module will then send out data through the module TX/SDA pin, after receiving the command, to the master MCU UART RX pin.

UART format: 8-bit data, no parity bit & 1 stop bit

Bit rate: 19200 bps

Control Command

To allow the Master MCU to control the RF module, the control commands for the TX and RX modules are provided as follows.

TX Control Command – only for the TX Module

| Command Name | C7 | C6 | C5 | C4 | C3 | C2 | C1 | C0 | Data Length | CmdO | CmdD | Comment |
|--------------|----|----|----|----|----|----|----|----|-------------|------|------|---------|
| SET_RF_FREQ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | | √ | |
| SET_TX_POWER | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | | √ | |
| START_RF_TX | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | | √ | |
| STOP_RF_TX | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | √ | | |
| GET_STATUS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | √ | |
| GET_VER | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | | √ | |

SET_RF_FREQ: Select RF frequency band

2-byte command: 1-byte command + 1-byte parameter

Command value: 10h

Parameter value: 00~03h for RF frequency band selection

00h: 315MHz, 01h: 433.92MHz, 02h: 868MHz,
03h: 915MHz

Note: The module RF frequency band is set to 433.92MHz during the manufacturing process. Therefore this command is not required under general situations.

Note: The command execution time is less than 4ms, the following command must therefore wait until this execution time has elapsed.

SET_TX_POWER: Setup the TX power

2-byte command: 1-byte command + 1-byte parameter

Command value: 12h

Parameter value: 00~0Fh for TX power selection, the greater value indicates that the greater power capacity is selected, the corresponding values are to be determined.

Note: The command execution time is less than 2ms, the following command must therefore wait until this execution time has elapsed.

START_RF_TX: Activate the RF wireless transmission and send 1-byte data

3-byte command: 1-byte command + 2-byte parameter

Command value: 23h

Parameter value:

First byte: Setup the transmission times, if the value is 00h then it will not stop transmission until a "STOP_RF_TX" command is received.

Second byte: Data to be transmitted.

STOP_RF_TX: Stop RF wireless transmission

1-byte command: 1-byte command + 0-byte parameter

Command value: 00h

Parameter value: No parameter

GET_STATUS: Read the TX module status

2-byte command: 1-byte command + 1-byte read-back parameter

Command value: 81h

Parameter value: 1-byte read-back parameter, described as below:

b0~2: Reserved.

b3: 1= TX module is transmitting data.

b4: 1= TX module is transmitting data continuously.

b5~7: Reserved.

GET_VER: Read the module version

3-byte command: 1-byte command + 2-byte read-back parameter

Command value: 90h

Parameter value: 2-byte read-back parameter, the first byte is the major version while the second byte is the minor version.

RX Control Commands – only for RX Module

| Command Name | C7 | C6 | C5 | C4 | C3 | C2 | C1 | C0 | Data Length | CmdO | CmdD | Comment |
|----------------|----|----|----|----|----|----|----|----|-------------|------|------|---------|
| START_RF_RX | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | √ | | |
| ENTRY_SADDR_MD | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | √ | | |
| GET_STATUS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | √ | |
| GET_RX_DATA | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | | √ | |
| GET_VER | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | | √ | |

START_RF_RX: RX module enters the receiving mode

1-byte command: 1-byte command + 0-byte parameter

Command value: 01h

Parameter value: No parameter

ENTRY_SADDR_MD: Enter the pairing mode

To receive data, the RX module must match to a TX module first. This command is therefore provided.

1-byte command: 1-byte command + 0-byte parameter

Command value: 02h

Parameter value: No parameter

Note: If the RX module operates without an external master MCU for command control, connect the module KEY/INTB pin to ground before powering on. Then remove the connection after the module is powered on for over 2 seconds, here the module can also enter the pairing mode.

GET_STATUS: Read the RX module status

2-byte command: 1-byte command + 1-byte parameter

Command value: 81h

Parameter value: 1-byte read-back parameter, described as below:

b0~1: Reserved

b2: 1= RX module is in pairing mode

b3: 1= RX module is in receiving mode

b4: 1= RX module has completed the pairing process

b5: 1= RX module has data to be read

b6~7: Reserved

GET_RX_DATA: Read RX module data

2-byte command: 1-byte command + 1-byte read-back parameter

Command value: 82h

Parameter value: 1-byte data

GET_VER: Read the module version

3-byte command: 1-byte command + 2-byte read-back parameter

Command value: 90h

Parameter value: 2-byte read-back parameters, the first byte is the major version while the second byte is the minor version.